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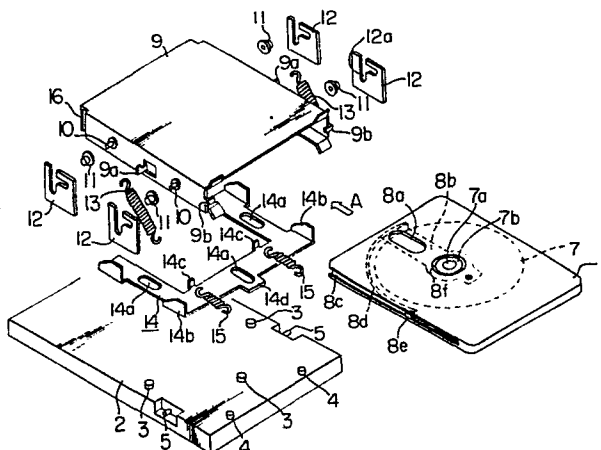
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54 Cartridge receiving apparatus.

57 A cartridge (8) receiving apparatus for receiving a medium (7) with signals recorded, having: a cartridge container (9) for receiving the cartridge; guide plates (12) enabling the cartridge container and the cartridge to move between the non-operative position to the operative position; and a sliding plate (14) having inclined parts (14b), which permits the cartridge container and the cartridge to move between the operative position and the non-operative position.

FIG. 2



CARTRIDGE RECEIVING APPARATUS

1 BACKGROUND OF THE INVENTION

(1) FIELD OF THE INVENTION

The present invention relates to a cartridge
(cassette) receiving apparatus which houses a medium
5 in which signals are recorded by a magnetic, optical,
mechanical or other similar means.

(2) DESCRIPTION OF THE PRIOR ART

A signal reproducing system or a signal
recording system provided with a horizontally arranged
10 cartridge (cassette) receiving apparatus is well known.
In general, in these apparatuses a cartridge (cassette)
is inserted into a receiving apparatus through a slot
formed in a housing of the system overcoming the
elasticity of an ejector spring, and when a medium with
15 signals recorded is inserted completely, the medium
is connected to a driving mechanism. After the
cartridge has been placed completely in the receiving
apparatus, the medium is driven by a signal reproducing
mechanism.

20 To withdraw the cartridge from the receiving
apparatus, the driving mechanism stops, the medium is
removed from the driving mechanism, and the medium
is ejected from the slot by means of the spring force
of the ejector spring. However, the cartridge must

1 not spring out from the receiving device owing to a
vibration or shock prior to the stopping of the driving
mechanism. Should the cartridge be readily ejected
from the receiving device, or, if not, should it be
5 temporarily removed from the receiving device, the
recording of signals in the medium or the reproduction
of signals from the medium would be carried out un-
reliably. It is essential, therefore, that the cartridge
can be easily loaded in the receiving device, and at
10 the same time that the cartridge be held securely, and
furthermore ejected with ease by a simple operation, when
necessary.

SUMMARY OF THE INVENTION

The object of this invention lies in offering
15 a cartridge receiving apparatus enabling a cartridge
to be loaded easily, to be held securely, and to be
ejected with ease, when necessary. More particularly,
this invention aims at offering a cartridge receiving
apparatus with an extremely simple structure in which,
20 when the cartridge is moved in advance in one direction
and inserted into the apparatus, subsequently the
apparatus automatically leads the cartridge to a proper
position, loading the cartridge with ease and properly,
and when the cartridge is ejected from the receiving
25 apparatus, the cartridge can be ejected by an extremely
simple operation.

1 BRIEF DESCRIPTION OF THE DRAWINGS:

Fig. 1 is a side elevational view of the essential parts of a receiving apparatus in accordance with this invention;

5 Fig. 2 is an exploded perspective view of the essential parts of the receiving apparatus of this invention;

Figs. 3a, 3b and 3c are side elevational views each illustrating the state of the cartridge prior to
10 loading in the cartridge container, the loaded state, the state of being ejected from the cartridge container;

Fig. 4 is a front elevational view of the sliding plate;

Fig. 5 is a front elevational view showing a
15 second example of the sliding plate;

Figs. 6a, 6b and 6c are front elevational views of the guide plates and sliding plate explanatory of the operation of the second example of the sliding plate; and

20 Fig. 7 is a perspective view of an erroneous operation preventing mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENTS:

Preferred embodiments of this invention will be explained hereinunder by referring to the drawings.
25 Referring first to Fig. 1, a box-like housing 1 shown by two-dot chain lines houses a system for recording or reproducing signals. A chassis 2 as well as the

1 receiving apparatus of this invention mounted on the
chassis 2 are accommodated in the housing 1. The
essential parts of the receiving apparatus consist of
a cartridge container 9, guide plates 12, and a sliding
5 plate 14, and the cartridge container 9 is formed as
the housing for containing the cartridge and is open
at its front side. Each guide plate 12 may be formed
separately and fixed to the chassis 2, or may alternately
be formed integrally with the chassis.

10 As illustrated in Fig. 2, each of the side
walls of the cartridge container 9 is provided with
pins 10 as well as a projection 9a. If necessary, a
rotatable sleeve 11 may be mounted on the pin 10. The
pin 10 engages with a guide channel 12a provided in the
15 guide plate 12. A tension spring 13 is retained at
one end by the projection 9a provided on each side wall
of the cartridge container 9, and the other end of the
tension spring 13 is retained by a projection 5 provided
in the chassis 2. The tension spring 13 stretched
20 diagonally. As for the sliding plate 14, pins 3
provided in the chassis 2 are inserted into long holes
14a provided in the sliding plate 14, and is retained
slidably on the chassis 2 in the direction of the arrow
A in Fig. 2. The sliding plate 14 is pulled in the
25 direction of the arrow C in Fig. 1 by means of tension
springs 15 each retained at one end by a projection
14c provided on the sliding plate 14 and at the other
end by a projection 4 provided on the chassis 2.

1 A cartridge 8 is moved in the direction of the arrow A
and inserted into the cartridge container 9 through an
opening 6 provided in the cartridge container. A
projection 14d provided in the sliding plate 14 has a
5 pushbutton (not illustrated) which extends by penetrat-
ing the wall portion of the housing 1, so as to operate
the sliding plate externally of the housing.

A cartridge 8, shown in Fig. 2, contain, for
instance, a magnetic disc 7. The magnetic disc 7 has
10 a central aperture 7a, and a hub 7b may be provided
in the periphery of the central aperture 7a, if necessary.
The cartridge 8 is also provided with a central
aperture 8f, and the disc 7 is rotated through this
central aperture 8f. In addition, the cartridge 8
15 is provided with a slot 8a through which the signals
are recorded in the disc 7 or recorded signals are
reproduced. Furthermore, the slot 8a of the cartridge
8 has a shutter 8b, and the slit 8a is opened or closed
as a projection 8e provided at the end of a belt 8d
20 fixed to the shutter 8b slides along a groove 8c provided
on one side of the cartridge 8. The projection 8e
slides as a projection 9b provided in the container 9
is fitted to the groove 8c, when, for instance, the
cartridge is housed in the container 9.

25 Figs. 3a, 3b and 3c show the state of the
cartridge 8 prior to being housed in the container 9,
the housed state, and the state of the ejection of the
cartridge 8 from the container 9. As shown in Fig. 3a,

1 the cartridge is moved in the direction of the arrow A
and inserted from the opening 6 of the container 9.
When the cartridge 8 is inserted fully into the
container 9, the cartridge 8 contacts with a wall 16
5 opposite to the opening 6. When the cartridge 8 is
further moved in the direction of the arrow A with a
force greater than the horizontal component of the tension
developed by the tension spring 13, the tension spring
13 stretches, which, in turn, allows the pin 10 to move
10 along a horizontal guide channel 12b, and both the
cartridge 8 and container 9 are moved in the direction
of the arrow A. When the pin 10 reaches the end
portion of the guide channel 12b, by the vertical
component of the tension developed by the tension spring
15 13, the pin 10 drops along a vertical guide channel 12c,
the tension spring 13 shrinks, and at the same time the
container 9 is lowered. When the pin 10 reaches the
lowermost end of the vertical guide channel 12c, the
movement (lowering) of the container 9 stops. In this
20 condition, a medium housed in the cartridge 8, e.g.,
the magnetic disc 7, is connected to a driving mechanism
(not illustrated). If the pin 10 is present in the
vertical guide channel 12c, the container 9 cannot be
moved in the direction of the arrow A or in the
25 reverse direction. Then, the container 9 is held in
the dropped position by the vertical component of the
tension developed by the tension spring 13.

In other words, in the cartridge receiving

1 apparatus in accordance with this invention, when the
cartridge 8 is housed in the container 9 and further
only pushed, the medium housed in the cartridge 8 is
easily mounted on the driving mechanism, and the
5 cartridge 8 is held securely in the container 9. On
the other hand, as shown in Fig. 3c, the sliding plate
14 is moved in the direction of the arrow A by overcoming
the tension of the tension spring 15 by the pressing
of the pushbutton (not illustrated), the tension spring
10 15 stretches, and the sleeve 11 fitted to the pin 10
provided in the cassette container 9 is brought into
contact with an inclined part 14b of the sliding plate
14. Furthermore, when the sliding plate 14 is moved,
the tension spring 13 stretches, and the sleeve 11 and
15 the pin 10 rise along the inclined part 14b and along
the vertical guide channel 12c. When the pin 10 reaches
the position of the horizontal guide channel 12b, the
tension spring 13 shrinks again, and the pin 10 moves
along the horizontal guide channel 12b in the direction
20 of the arrow C. Accordingly, the container 9 and the
cartridge 8 also move in the direction of the arrow C.
As a result, it becomes possible to withdraw the
cartridge 8 from the container 9. If the force applied
to the sliding plate 14 is removed, the tension spring
25 15 shrinks, and the sliding plate 14 returns to the
position shown in Fig. 3a. Fig. 4 shows the sliding
plate 14. The height H_1 of the sliding plate 14
must be sufficient to move the pin 10 from the vertical

1 guide channel 12c to the horizontal guide channel 12b.
Also, it is preferable that the height H_1 is lower than
the horizontal guide channel 12b. It goes without saying
that the inclination angle θ of the inclined part 14b
5 must be selected appropriately. If a large inclination
angle θ is selected, the moving distance of the
sliding plate 14 becomes large; while if a smaller
inclination angle θ is selected, the moving distance of
the sliding plate 14 becomes small. But this neces-
10 sitates a greater force to move the sliding plate 14.

Fig. 5 shows a second example of the sliding
plate. In the sliding plate 14, shown in Fig. 5, an
upwardly-extending hook part 14e is formed so as to
oppose the inclined part 14b. It is preferable that the
15 height H_2 of the hook part 14e is made higher than the
height H_1 of the inclined part 14b. The function of
the hook part 14e is explained by referring to Figs.
6a, 6b and 6c, which are enlarged views of the guide
plate 12 and associated parts. When force F_1 is applied
20 to the container 9, and the pin 10 moves with the
container 9 along the horizontal guide channel 12b in
the direction of the arrow A, the pin 10 is brought
into contact with the hook part 14e, and the pin 10
moves the hook part 14e in the direction of the arrow
25 A. When the hook part 14e moves, the sliding plate 14
also moves in the direction of the arrow A. When the
pin 10 shortly reaches the vertical guide channel 12c,
the pin 10 drops along the guide channel 12c. When the

1 pin 10 reaches the lowermost end of the guide channel
12c, the sliding plate 14 moves in the direction of
the arrow C, and the hook part 14e engages with the pin
10. In this condition, the pin 10 is held inside the
5 vertical guide channel 12c. Therefore, if the sliding
plate 14 having the hook part 14e is used, the pin 10
will not move vertically along the guide channel 12c
even if a large vibration is applied to the container
9. Accordingly, the pin 10 is held securely at the
10 lowermost end of the guide channel 12e. If the sliding
plate 14 is moved in the direction of the arrow A, the
hook part 14e is disengaged, and the pin 10 moves
from the guide channel 12c to the guide channel 12b by
means of the inclined part 14b.

15 The sliding plate, shown in Figs. 4 and 5, in
biased by the tension spring 15, and is usually placed
in the position shown in Fig. 3a. Accordingly, in case
that the cartridge 8 is not inserted properly into the
container 9, e.g., if the cartridge 8 is inserted
20 obliquely into the container 9, and if the container 9
is pushed in the direction of the arrow A in Fig. 3A
with the end of the cartridge 8 collided against the
opening 6 of the container 9, the cartridge 8 moves in
the direction of the arrow A, and the pin 10 drops
25 along the vertical guide channel 12c without the cartridge
8 being properly housed in the container 9. In this
case, the cartridge 8 is not properly loaded in the
apparatus.

1 Fig. 7 shows a mechanism preventing the afore-
mentioned erroneous operation. The essential part
of this mechanism is a lever 25, which is supported
rotatably by a pin 24. The pin 24 is fixed to the
5 chassis 2. A pawl 27 is formed at the end of the
lever 25, and the pawl 27 is engaged with a mating
recess 14f formed at the end of the sliding plate 14.
A rod 28 is fixed to the other end of the lever 25,
which extends vertically. A stopper 23 is formed in the
10 chassis 2, and a torsion spring 26 is retained by
the stopper 23, the pin 24 and one side portion of the
lever 25. The torsion spring 26 acts to rotate the
lever 25 in the direction of the arrow D. The stopper
23 prevents the excessive rotation of the lever 25.
15 In the state in which the sliding plate 14 is moved in
the direction of the arrow A and the cartridge 8 is
ejected from the container 9, the recess 14f of the
sliding plate 14 engages with the pawl 27 of the lever
25. As a result, the sliding plate 14 cannot return
20 in the direction of the arrow C. In this condition,
the inclined part 14b of the sliding plate 14 closes
the vertical guide channel 12c of the guide plate 12.
Consequently, even if the container 9 is moved in the
direction of the arrow A, the pin 10 cannot lower the
25 vertical guide channel 12c. When the cartridge 8 is
housed properly in the container 9, an end surface 8a
of the cartridge 8 is moved to contact with the rod 28,
which is made to move in the direction of the arrow E.

1 As a result, the lever 25 rotates in the reverse direc-
tion of the arrow D, and the pawl 27 is removed from
the recess 14f. Then, the sliding plate 14 moves in
the direction of the arrow C, permitting the pin 10
5 to lower the vertical guide channel 12c. In other
words, if the mechanism shown in Fig. 7 is used, the
pin 10 of the container 9 is allowed to lower the
vertical guide channel 12c only when the cartridge 8
has been housed properly in the container 9. Further-
10 more, the lever 25 may be such that it retains the
sliding plate 14 when the cartridge 8 is housed in the
container 9, and that the lever 25 is disengaged from
the sliding plate 14 when the cartridge 8 has been
housed properly in the container 9, thereby allowing the
15 sliding plate 14 to return.

As explained above, the receiving apparatus
according to this invention has an extremely simple
structure, and the cartridge can be positioned properly
in the system by a very simple operation, and held
20 securely therein. Furthermore, the cartridge can be
ejected with facility by a simple operation, as
required.

C L A I M S

1. A cartridge receiving apparatus for receiving a cartridge (8) containing a medium (7) with signals recorded, comprising:

- a) a cartridge container (9) having a housing provided on one end with an opening (6) for receiving said cartridge (8), said housing having a plurality of pins (10) protruding from side surfaces thereof;
- b) guide plates (12) having guide channels (12a) in which said pins provided in said cartridge container can be moved, having horizontal guide channels (12b) used for locating said pins of the container in a first high position as well as vertical guide channels (12c) communicated with these horizontal guide channels and used for positioning said pins of the container in a second lower position;
- c) a chassis (2) to which said guide plates (12) are fixed;
- d) a sliding plate (14) held slidably on said chassis between a third position and a fourth position, having inclined parts (14b) provided on said guide plate in parallel with said guide plates, said inclined parts (12b) delivering said pins of the cartridge container along said vertical guide channels (12c) from the second low position to said horizontal guide channels, when said sliding plate (14) is slid from the third position to the fourth position;

e) a first tension spring (13), one end of which is retained (9a) by said cartridge container, the other end of which retained (5) by said chassis, and which is adapted to move said pins of the cartridge container to the first high position when said pins are located in said horizontal guide channels, and further adapted to move said pins to the second lower position when said pins are located in said vertical guide channels; and

f) a second tension spring (15), one end of which is retained by said sliding plate (14), the other end of which retained by said chassis (2), and which is adapted to move said sliding plate from the fourth position to the third position.

2. A cartridge receiving apparatus according to Claim 1, wherein, said sliding plate (14) has hook parts (14e) opposing the inclined parts (14b) thereof in the sliding direction, wherein said hook parts (14e) engage said pins (10) and hold said pins in the second position when said sliding plate (14) is in the third position.

FIG. 1

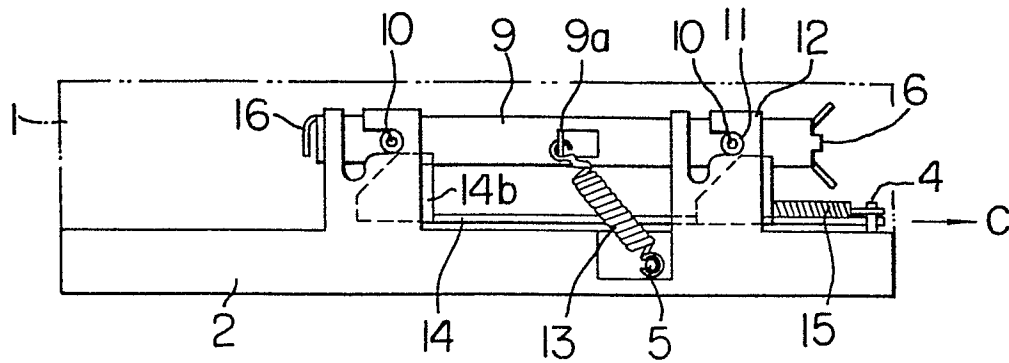


FIG. 3a

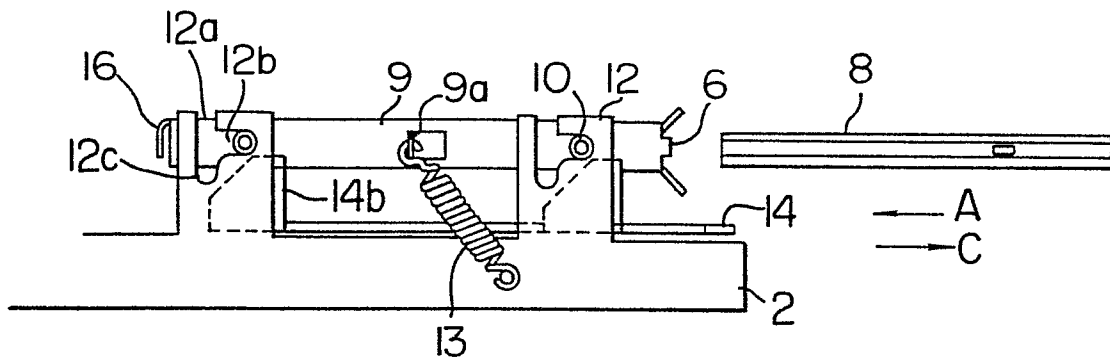


FIG. 3b

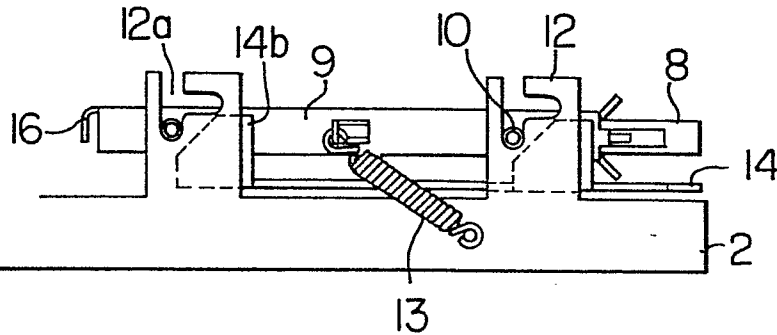


FIG. 3c

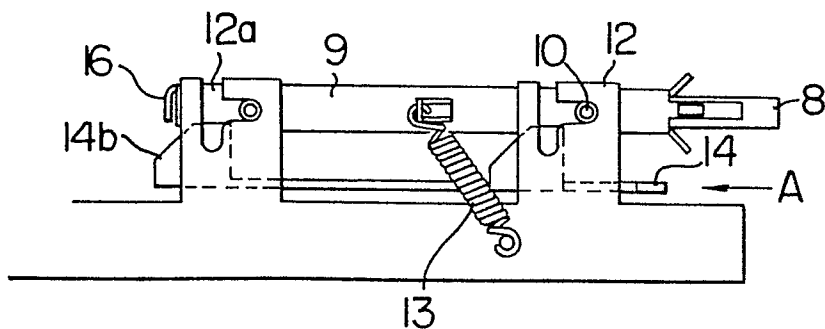


FIG. 2

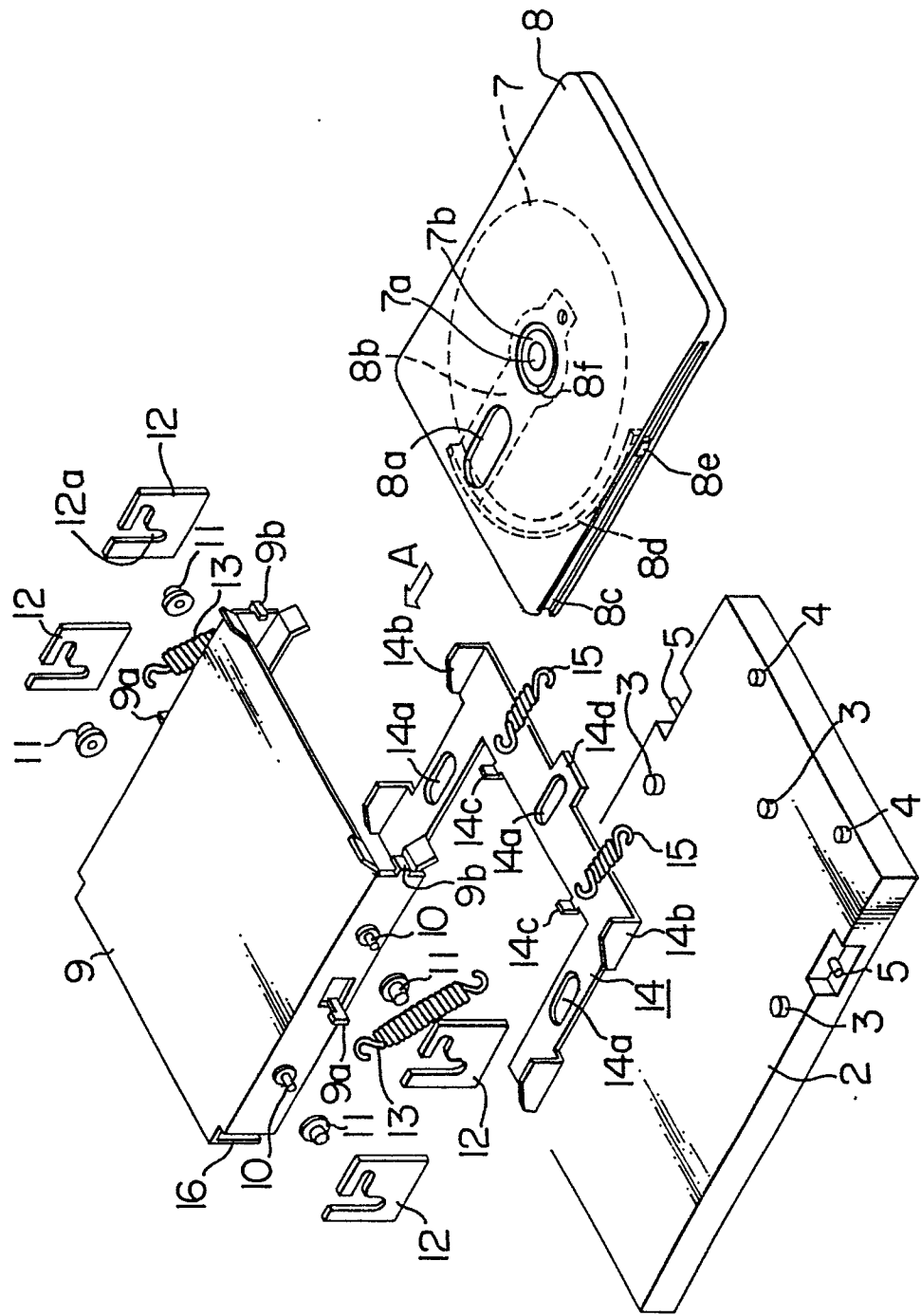


FIG. 4

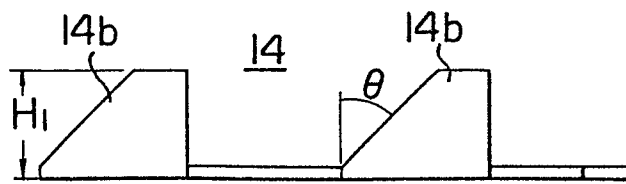


FIG. 5

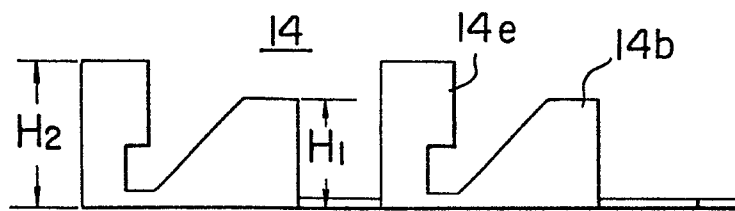


FIG. 6a

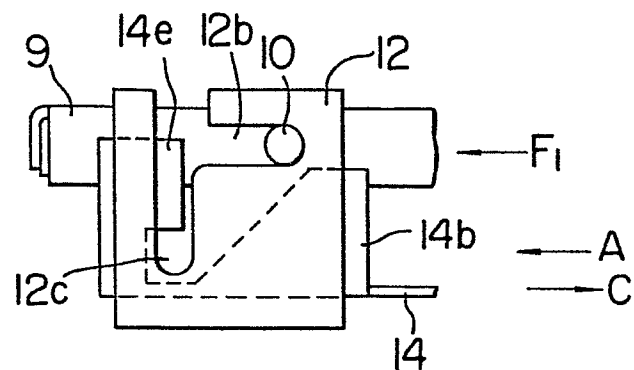


FIG. 6b

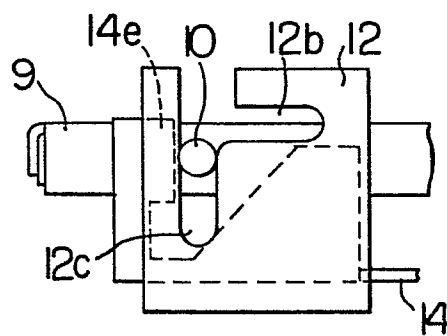


FIG. 6c

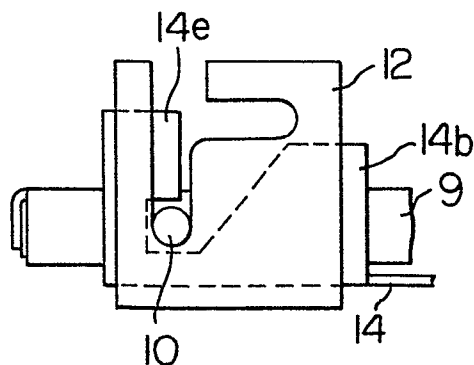
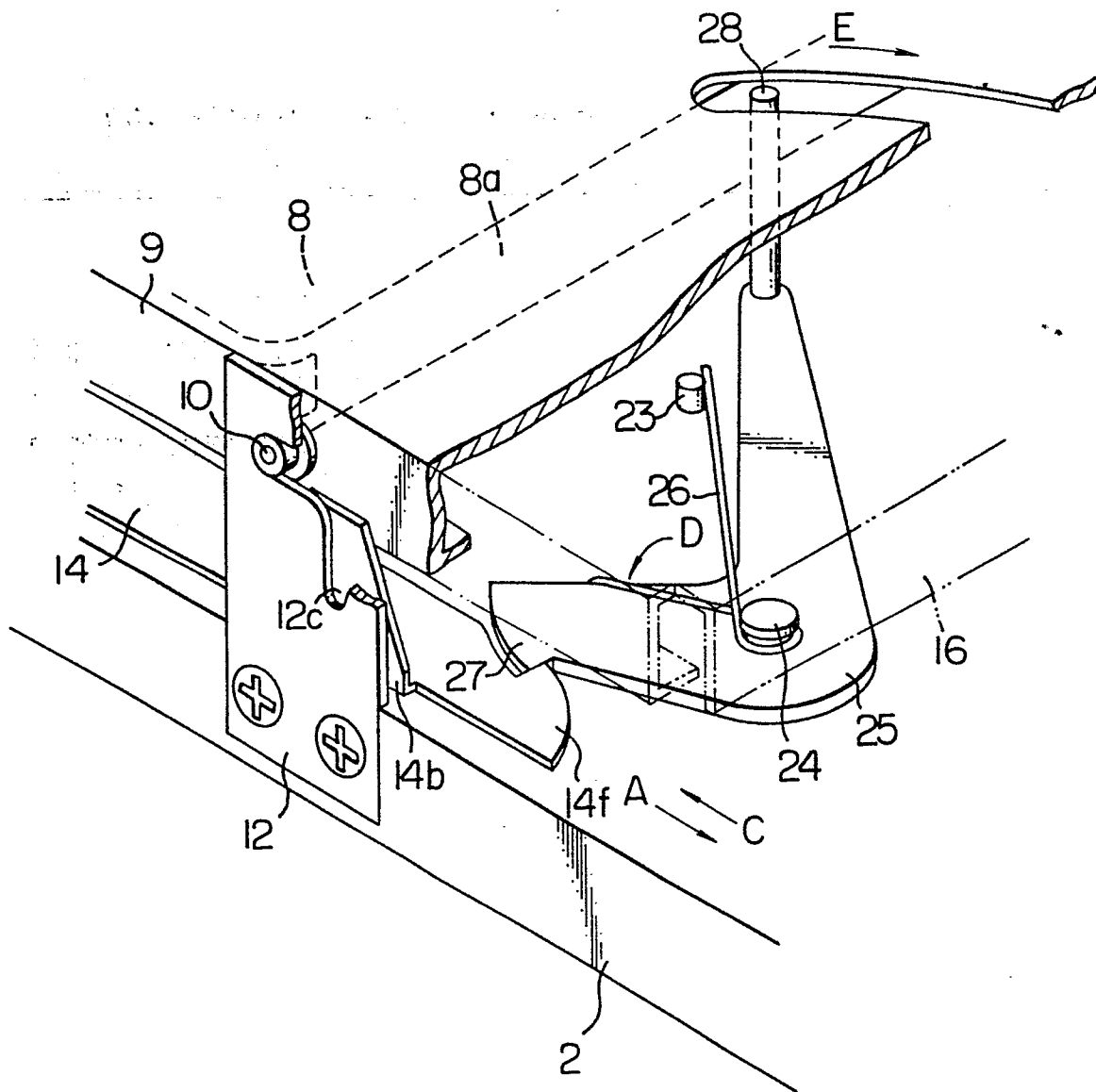


FIG. 7





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	--- US-A-4 272 795 (DAVIS, Jr. et al.) *column 5, lines 12-65; column 8, line 51 - column 10, line 4; figures 1,4,5*	1	G 11 B 17/04
A	--- DE-A-2 743 615 (SIEMENS) *Page 4, line 18 - page 7, line 34; figure 1*	1	
A	--- DE-A-3 026 432 (TOKIO SHIBAURA DENKI) *Page 11, line 22 - page 13, line 14; page 16, line 10 - page 17, line 24; figures 1,2*	1	
A	--- FR-A-2 254 086 (OLIVETTI) -----	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			G 11 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 04-03-1983	Examiner SANDRI S.E.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	